

Technical Aspects of the Interconnection Review Process

presented by Bill Brooks

FOCUS Team

Background

- At the December workshop it was decided to separate the discussion on interconnection issues in technical and non-technical working groups.
- On January 5th the first technical working group meeting was held.
- At this meeting, the interests of the various stakeholders were discussed to determine the direction for the process.

Basic Interests of Stakeholders

- Need to streamline the process. Especially to make smaller installations (under 500 kW) easier.
- Need for a set of requirements that allow “plug-and-play” of DG for as many installations as possible.
- Process should focus on what can be solved within the given timeframe.
- Result should be broadly transferable to other states, regions, municipalities, etc...

Initial Approach for Developing Requirements

- Group suggested starting with the Texas interconnection document. (most recent and used California Rule 21 as a resource).
- A “Strawman Team” consisting of 10 group members from various stakeholder viewpoints was assembled to review the Texas document and develop a strawman document for the larger group to review and comment upon.

Strawman Document Development

- The individual group members reviewed the Texas document and a series of meetings and conference calls were held to guide the first draft of the document.
- This process identified shortcomings of Texas document that needed addressing in order to meet the expressed interests of the technical working group.
- Draft was presented at the February 15 meeting of both working groups.

Recommendations of the Strawman Team

- Keep requirements ‘performance-based’ rather than ‘prescriptive-based.’
- Make the requirements size-independent. Remove references to system size.
- Establish “screening process” to address individual technical issues that must be addressed for each installation.
- Begin developing specific language for testing and certification process to support simplified interconnections.

Strategy to Develop Document for Siting Committee Review

- Establish screening process subcommittee to address primary issues to include in the screen.
- Establish testing and certification subcommittee to begin to develop the testing requirements to verify the performance of the DG interconnection equipment.
- Continue revisions of the main technical document and interface with non-technical group on those issues that are cross-cutting.

Results of Technical Working Group

- Technical requirements identified under three main headings:
 - 4.2 General Interconnection and protection requirements
 - 4.3 Prevention of interference
 - 4.4 Control, protection and safety equipment requirements

4.2 General Interconnection and protection requirements

- This section deals with those requirements that are generic to all distributed generators.
- It addresses such requirements as
 - not reenergizing deenergized lines,
 - not contributing to an Unintended Island, and
 - the fact that Certified equipment is acceptable to all California Electrical Corporations.

4.3 Prevention of interference

- Deals primarily with the limits of operation of the DG so as to prevent interference on Customers and the operation of the Distribution System.
- It addresses
 - Voltages limits and voltage flicker
 - Frequency limits
 - Power Quality (harmonics, DC injection, and, power factor)

4.4 Control, protection and safety equipment requirements

- This section covers the control requirements related to the protection and safety functions of the DG.
- It addresses
 - 4.4.1 Basic Requirements
 - 4.4.2 Technology Specific Requirements
 - 4.4.3 Initial Review process
 - 4.4.4 Supplemental DG Requirements
 - 4.4.5 Generating Facility types and conditions not identified

4.4.1 *Basic Requirements*

- 4.4.1.1 Protective function requirements
 - All DG must have:
 - visual open disconnect device
 - a fault-interrupting device
 - an over/under voltage trip function
 - an over/under frequency trip function
- 4.4.1.2 Limits specific to single-phase generators

4.4.2 Technology Specific Requirements

- 4.4.2.1 Three-phase synchronous generators
- 4.4.2.2 Induction Generators
- 4.4.2.3 Inverter Systems

4.4.3 *Initial Review process*

- It evaluates the specific characteristics of the Interconnection, including those specific to the location of the Generating Facility, and whether additional requirements are necessary.
- It includes a screening process which is a series of pass/fail criteria that help identify the simple cases for interconnection.
- The screening process does not eliminate any DG from interconnecting.

The Screens

- Export Screen
 - If power is not exported, utility voltage regulators are not affected and reverse-power functions can be used to mitigate Unintended Islanding.
- Certification Screen
 - If equipment is Certified, it does not need to be separately reviewed and tested by each utility.

Fault Current Contribution Screen

- If fault contribution is minimal, then there is no impact on the Electrical Corporation's:
 - equipment short circuit duty
 - fault detection sensitivity
 - relay coordination
 - fuse-saving schemes

Line Configuration Screen

- If the primary system is three-wire or the DG interconnection transformer is single-phase (line-to-neutral), then there is no concern about overvoltages to the Electrical Corporation's or Customer's equipment caused by loss of system neutral grounding during brief Unintended Islands.

Importance of the Screening Process

- It provides a standardized, methodical procedure for addressing the individual technical issues of interconnection.
- It leads the way to identifying the greatest concerns with a specific DG installation and the degree of review necessary to develop the interconnection requirements.
- It is the shortest near-term path to the “plug-and-play” world that we all want for DG.